horticulture and extend the knowledge of beautiful flowers, shrubs and trees, and of the best ways of dealing with them. Botanists, horticulturists, and all lovers of plants should see the number which commences the new series. Among the articles we notice one on the Royal Gardens, Kew, illustrated, as are the other contributions, with several instructive half-tone pictures.

ASTRONOMY figures prominently in the January number of *Knowledge*. Mr. A. Fowler contributes an article on the constituents of the sun, in which he summarises the researches and conclusions of modern solar physics. Mr. E. W. Maunder commences a series of articles on astronomy without a telescope, and the Rev. J. M. Bacon describes the balloon ascent made by him with the object of observing the Leonid meteors. Among other subjects of articles are plants and their food, by Mr. H. H. W. Pearson, and the natives of Australia and their origin, by Mr. R. Lydekker, F.R.S.

OUR contemporary, *Science Gossip*, is doing good work in publishing a series of papers, by competent naturalists, dealing with different groups of the British invertebrate fauna, in the form of popular monographs. Portions of three memoirs of this series appear in the January number—namely, one, by Mr. Sopp, on dor-beetles; a second, by Mr. Soar, on freshwater mites; and a third, on spiders, by Mr. F. P. Smith. By the quotation from *Antony and Cleopatra*, the author first named seems to have proved beyond cavil that the Shakespearian term *shards* refers to the elytræ of the dor-beetle. While thus keeping in the main to the British fauna, the editor has admitted one descriptive paper dealing with a wider area—to wit, a contribution, by Dr. H. C. Lang, describing the Palæarctic butterflies, of which the present section is devoted to the numerous species of the beautiful genus *Parnassius*.

THE *Jubelband* of the *Zeitschrift für physikalische Chemie* contains an interesting memoir by Dr. T. Estreicher upon the solubility of argon and helium in water. The value given by Prof. Ramsay in his preliminary note in 1895 for the solubility coefficient of helium (·0073 at 18°·2) would make helium the least soluble of gases, a conclusion borne out by its exceedingly low critical point: but from the experiments of Dr. Estreicher it would now appear that the true value of the coefficient is about double this preliminary value. The apparatus used was identical in principle with that of Ostwald, but was improved in two important points: the use of a glass spiral connecting the measuring and absorption vessels, enabling the apparatus to be made wholly of glass, and the immersion of the whole apparatus in water. This water jacket rendered accurate determinations of the solubility coefficients possible at temperatures between 0° and 50° C. The results are plotted in the form of curves, nitrogen being also shown on the same scale for the sake of comparison. The solubility curve of argon is of the usual type, decreasing with rise of temperature from ·0578 at 0° to ·02567 at 50°. The solubility of helium varies very slightly with temperature, the curve exhibiting a minimum at about 25° C., the values being ·015 at 0°, ·01371 at 25°, ·01404 at 50°. The nitrogen and helium curves intersect at 30°, where their solubilities are the same; above this temperature nitrogen has a smaller solubility than helium. The author points out that although the occurrence of a minimum of solubility is peculiar, it is not unique, since Bohr and Bock found a minimum of solubility for hydrogen at about 60°.

THE additions to the Zoological Society's Gardens during the past week include a Diana Monkey (*Cercopithecus diana*) from West Africa, presented by Mr. S. W. Thompston; a Common Tern (*Sterna fluviatilis*), European, presented by Mr. J. Newton; a Tawny Owl (*Syrnium aluco*), British, presented by Madam de Bunsen; Moor Macaque (*Macacus maurus*) from the East Indies, a Crested Porcupine (*Hystrix cristata*) from West Africa, two Crossbills (*Loxia curvirostra*), European; three Serrated Terrapins (*Chrysemys scripta*), a Prickly Trionyx (*Trionyx spinifer*), a Bull Frog (*Rana catesbiana*) from North America, deposited; two White-eyebrowed Wood-Swallows (*Artamus superciliosus*), two Masked Wood-Swallows (*Artamus personata*) from Australia, purchased.

OUR ASTRONOMICAL COLUMN.

CENTRAL STAR OF RING NEBULA IN LYRA.—M. W. Stratonoff, of the Tashkent Observatory, has been engaged in measuring the brightness of the central star of the annular nebula in Lyra, and has communicated his results to the *Astronomische Nachrichten*, Bd. 151, No. 3607. A considerable number of photographs of the nebula have been obtained with the large telescope of 0·83m. aperture, extending over the period September 8, 1895, to September 15, 1899, the exposures varying from 30 to 90 minutes. From his measures of the brightness of the central star as compared with the magnitudes of 30 neighbouring comparison stars, M. Stratonoff shows that the magnitude varies from 13·1 to 9·5. A special series of photographs taken with extra long exposures, however, renders the question of variability, as measured from photographic impressions, somewhat doubtful. On a plate exposed for anything between 22m. and 1h. 23m. the mean magnitude of the star was 11·6. On a plate exposed for 10 hours, the magnitude was 10·1; while on exposing for 20 hours, the measured magnitude was 3·6. The author suggests, as explanation of this, that the star may really be simply a condensation of part of the whole nebulous matter, and the effect of long exposure will be to lessen the contrast between the condensed centre and the outlying fainter matter.

THE INDIAN UNIVERSITY OF RESEARCH.

A Conference was held at Simla at the end of October last to consider the Tata scheme for a Research University for India. A full report of the Conference is in the Madras *Educational Review*, from which the following particulars have been derived:—

The gentlemen invited by the Government of India to meet in conference with Mr. J. N. Tata regarding the proposed University were as follows:—The Hon. Mr. T. Raleigh, presiding, Mr. Jamsetji N. Tata (with his Secretary, Mr. Padshah), the Hon. Mr. Justice Ranade, Surgeon-General Harvey, the Hon. Dr. Duncan, Director of Public Instruction, Madras, Prof. Pedler, F.R.S., Director of Public Instruction. Bengal, Mr. Sime, Director of Public Instruction, Punjab, Principal MacMillan, Bombay, Mr. A. H. L. Fraser, Officiating Home Secretary.

The Conference first discussed fully the manner in which the scheme should be launched, so as to keep in view the ultimate ideal and at the same time make progress as funds permit. The Conference were of opinion that it is an essential feature of the scheme to have a central institution for research, as well as a central authority to control the operations conducted under the scheme. And they were of opinion that there is ample room, and indeed a clear necessity, for such a central institution.

At the same time they realised the necessity for taking advantage of existing facilities for research, whether in the shape of special local facilities (as of trade, products, &c.), or in the shape of good laboratories or museums, and men qualified for scientific research. They acknowledged that even in the unfavourable circumstances hitherto existing, students had shown in certain instances distinguished aptitude and capacity for research; and they believed that much good would be done by the grant of studentships, and also, where necessary, by assistance to the teaching and supervising staff. While, therefore, recognising that a central institution is necessary, and that there are certain departments of research (such as Technical Chemistry), which must even from the very first be provided for at that central institution, they recommended that at the outset every effort should be made to utilise existing facilities

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and so economise funds and resources. It is undoubtedly clear that certain branches of research must be conducted away from the central institution. But the Conference are of opinion that that institution should be gradually strengthened as circumstances permit.

The Conference also concurred fully in the view accepted by the Provisional Committee that certain parts of the scheme should be first carried out, and that the rest should follow as funds permit. They concurred in giving preference to Parts I. (Scientific and Technical) and II. (Medical) and leaving Part III. (Philosophical and Educational) to follow, though they were of opinion that the promoters of the scheme and its governing body ought to keep in view the scheme in its entirety. They were also of opinion that the scheme of studies and of subjects should be stated in the most general terms, and that provisions should be made for its revision from time to time so as to leave the authorities in charge of the work as free a hand as possible in taking up subjects that seemed specially at any time to demand attention, and in conforming to the progress of science. In regard to bacteriology, they were quite prepared to postpone action, both because there are many subjects to which the funds may at the first be at least as usefully applied, and also because they understood that the Government of India are taking such action as seems at present necessary in regard to this subject. They think that probably the best application of their funds to this subject, for the present at least, will be the provision of studentships in the Government institutions.

The Conference considered the question of the site of the central institution. It seemed to them that of all the sites named the choice lay between Bombay and Bangalore. In regard to the former the main considerations were (1) the fact that it is the home of the founder (who, however, rather favours Bangalore); (2) that it is a great centre of commercial and industrial activity; (3) that it is easy of access from all parts of India and from England; and (4) that a strong governing body could be easily obtained there. On the other hand, the climate, though not altogether unfavourable, is not bracing, and is injurious to machinery and apparatus. It would not be so favourably regarded by Europeans as Bangalore, and in Bombay land is not available in sufficient quantity. If (as is believed) special concessions in respect to site, and aid in regard to the scheme generally, be made in Bangalore on condition of the institution being there, the Conference would recommend that site.

The Conference considered the name or title of the institution. There was a strong opinion in favour of the title "Institute" as more suitable than "University" to the objects in view. But in deference to the views of Mr. Tata, and in consideration of the sentiment of the educated community of India, the Conference decided that it was expedient to adopt the well-known title of "University." They, therefore, decided to recommend that the institution be styled "The Indian University of Research." They were, however, of opinion that it should maintain its post-graduate character, and that it should, therefore, grant not degrees but fellowships.

The Conference are unanimously of opinion that there is great need for such an institution as has been indicated; that there is no reasonable ground for doubt that its work would be successful; that it would exercise a most beneficial influence on higher education and on the development of the resources of the country; and they strongly recommend it to the sympathy and support of the Government of India. They trust the Government of India will express their favourable opinion on the scheme, and give the promise of necessary legislation to be carried out as soon as it is matured, so that an appeal may be made to the public for funds, and that the details of the scheme may be definitely settled.

The Conference then proceeded to revise the Draft Bill and determined to recommend the Draft Bill as revised to the Government of India for publication. And at the request of Mr. Tata they resolved to ask the Government of India to nominate some officer to consult with him about the transfer of the property with which he proposed to endow the University.

The *Gazette of India* gives the following outline of the Tata University scheme:—It is proposed to found an institution which shall be or correspond to a teaching University for India, its primary aim being to teach, not to examine. Diplomas, therefore, will be conferred on those who have completed a certain course of higher education. This work of higher instruction will be conducted on principles followed now in Europe—*e.g.* in German Seminaria, French Conferences, and English and American Research Classes. These courses will be the beginning of a purely specialist training. In order not to interfere with the existing agencies, the new institution will take up teaching where Colleges and existing Universities leave off. The new courses will be post-graduate. The new specialist courses, which are post-graduate, will naturally be professional and technical, rather than simply literal school sanitary and science practice. For qualified medical men a school of pedagogics for those intending to be higher secondary teachers (inspectors, head-masters, &c.), and a school for higher studies, are some of the obvious directions of the development. It is not proposed to take all these up at once. The order in which they may be proceeded with will be best arranged by the committee. It is not intended to cut off the post-graduate students from education in Europe. It is contemplated to select the best for further training in Europe or America, with a view to their future return to this country. It will be necessary to make ample provision for scholarships and fellowships, both for the students in the institution and for those who proceed from it to Europe or America. The development of a scheme so complete must entail a vast capital annual expenditure, the construction of libraries, laboratories and museums, and the invitation to specialists to teach and prosecute research. All this must require large sums of money. A committee has been formed to secure the necessary financial support by making a general appeal for funds to take the preliminary steps in connection with the scheme, and to obtain a short legislative enactment enabling the institute to hold property.

His Excellency the Governor, the Chancellor of the University of Bombay, has kindly consented to let it be known that the proposed scheme has his personal approval and sympathy.

The Government of India accept the recommendations of the Conference, and they desire to place on record their appreciation of the generosity and public spirit displayed by Mr. J. N. Tata in making his munificent offer of an endowment for the proposed University of Research. They are confident that the proposed University will meet a great need, and will contribute to the advancement of higher education and the development of the resources of the country. They will be ready to proceed to legislation as soon as the scheme has been matured in all its details. They wish the undertaking every success. In accordance with the request made by the Conference, the Government of India have requested the Government of Bombay to nominate an officer to arrange with Mr. J. N. Tata for the transfer of the property with which he proposes to endow the University.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. F. KOHLRAUSCH, president of the physikalisch-technischen Reichsanstalt, has been appointed honorary professor of physics at Berlin.

MR. G. F. HARDCASTLE, senior assistant in the chemical department of the Technical College, Huddersfield, has been appointed instructor in dyeing, and assistant in chemistry, at the Municipal Technical School, Leicester.

THE Annual General Meeting of the Association of Technical Institutions will be held on Wednesday, January 24, at the Mercers' Hall, London. The president (Earl Spencer, K.G.) will preside, and an address will be given by the president-elect, Sir Swire Smith.

A COURSE of fifteen lectures on organic chemistry will be given at the Goldsmiths' Institute, New Cross, S.E., on Friday evenings, at 8.30, by Mr. W. J. Pope, commencing on January 19. Particular attention will be paid to the discussion of recent work and current views relating to organic chemistry.

THE University of Pennsylvania's free museum of science and art at Philadelphia, one of the late Dr William Pepper's cherished hopes, was, says *Science*, formally opened in the presence of several thousand people on December 20. Immediately following the presentation to the board of trustees of the museum, a bronze statue of the late Dr. Pepper, the gift of friends, was unveiled. Mrs. Pepper, the widow of Dr. Pepper, has presented to the university trustees, as her memorial to the memory of her husband, a gift of 50,000 dollars, as a fund to carry on the work started by Dr. Pepper.

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